

Remarks

Claim 1 - 20 are pending. Favorable reconsideration is respectfully requested.

The subject invention is directed to moisture-curable organopolysiloxane RTV-1 compositions of very low modulus. RTV-1 compositions are in widespread use as caulks and sealants. In these applications, it is necessary for the composition to adhere to the substrate and also to have a modulus which is low enough such that upon movement of the substrates relative to each other, the force exerted on the sealant is reflected by elongation of the sealant without transfer of high forces to the substrate/elastomer interface. Otherwise, the sealant will detach from the substrate.

Forming the sealant from high molecular weight organopolysiloxanes would lower the modulus, but would result in compositions which are too viscous for normal commercial use. Some means of providing low modulus to the cured sealant while offering low viscosity in the uncured state is desirable. Applicants have found that the use of specific N,N-dialkylaminomethyldialkoxyalkylsilanes are highly efficient chain extenders in such systems, when used in conjunction with a very minor amount of a deactivator.

The claims have been rejected under 35 U.S.C. § 112 ¶2 with respect to the term "deactivator". A deactivator is a substance which deactivates the system from instability during storage but which does not interfere with cure. While Applicants do not believe the term to be indefinite based on its description, Applicants have voluntarily amended the claims to recite that the deactivator is an organic isocyanate. Claim 2 which contained this further limitation has been amended to recite that the deactivator is one of the three aliphatic or cycloaliphatic isocyanates indicated as preferred in the specification.

Claim 11 has been amended to recite that the organooxy groups are bonded via Si-O bonds, rendering them reactive in RTV-1 compositions. Withdrawal of the rejections of the claims under 35 U.S.C. § 112 ¶2 is solicited.

Claims 1 - 4 and 7 - 15 have been rejected under 35 U.S.C. § 102(b) over Lucas U.S. Patent 4,483,973 ("Lucas"). Applicants submit that the recitation that the deactivator is an isocyanate alone distinguishes the presently claimed invention from *Lucas*, although the amendment to the claims was not made for this purpose. The subject invention also requires a specific aminomethylsiloxane chain extender, which Applicants fail to find disclosed, taught, or suggested by *Lucas*. In column 14, formula 9 recites certain aminoalkyl-functional silanes, however the bridging R¹² group is a C₂₋₁₂ divalent hydrocarbon radical, not a C₁ hydrocarbon radical as required by the present claims. Withdrawal of the rejection of claims 1 - 4 and 7 - 15 over *Lucas* is respectfully solicited.

Claims 1 - 4 and 7 - 15 have been rejected under 35 U.S.C. § 103(a) as unpatentable over JP 63-083167 ("JP '167") in view of Chung U.S. 4,495,331 ("Chung"). Applicants respectfully traverse this rejection.

Applicants have obtained a translated copy of *JP '167* which is enclosed for the convenience of the Examiner. *JP '167* discloses the use of tertiary aminomethyldialkoxysilanes as a chain extender in moisture curable RTV-1 compositions, together with a trialkoxysilane or siloxane which is described as a necessary component (Applicants' optional component e)). At page 6, middle of the full paragraph, *JP '167* states that the aminomethyldialkoxysilanes also function as a water scavenger, reacting, for example, with water contained in fillers, or from other sources.

Chung discloses an "improvement" in moisture curable RTV-1 organopolysiloxane compositions as earlier disclosed by White in U.S. patent 4,395,526 ("White"). The compositions of *White* had included a silanol-terminated base polymer, crosslinking silane, condensation catalyst, and a silane scavenger for hydroxyl groups, for example those of water and alkoxy-breakdown products, *i.e.* alkanols such as methanol. At column 1, lines 34 - 55, *Chung* discusses contributions of others to the basic invention of *White*, by disclosing other silane and siloxane scavengers. The contribution of *Chung* to the RTV-1 art is the addition of organic isocyanates to the composition as hydroxyl scavengers,

replacing the more expensive silane and siloxane scavengers of the prior art. The amounts required are stated to be an “effective amount” (Column 2, lines 49 - 52), and the amounts exemplified are all rather large, from 0.5 weight percent to about 2 weight percent, all the isocyanates employed being difunctional.

Applicants respectfully traverse the rejection of claims 1 - 4 and 7 - 15 over *JP '167* in view of *Chung* for several reasons. As background, the Examiner should note that *Chung* is an old reference, having issued some 20 years ago, and the use of hydroxyl scavengers is well known to those skilled in the silicone elastomer art, and to the present inventors in particular. In fact, scavengers are in common use in the types of RTV-1 compositions of *White* and *Chung*. However, to be effective, the scavenger must be present in at least a stoichiometric amount relative to total water, alkanol, and other hydroxyl functionality, as is also well known. Moreover, since the amounts of hydroxyl group-containing substances in the composition's raw ingredients will vary, as will also the amount of water absorbed from the atmosphere during processing, it is extremely difficult (and expensive) to utilize exactly a stoichiometric amount. Rather, an excess is used which is sufficient to take into account the maximum hydroxyl content under worst case conditions, for example a 3% excess. It is for this reason that the isocyanates (and diisocyanates as well) of *Chung* are used in relatively large amounts.

Applicants' Examples illustrate clearly that the isocyanates of the subject invention are not hydroxyl scavengers. They are present in far too small an amount to function in this capacity. Note Examples 1, 2, and 3, where the weight percentage of monoisocyanate is only 0.2%, 0.1%, and 0.1%, respectively. At 0.5% of diisocyanate the composition of Example 1 of *Chung* exhibited instability, which disappeared when the amount was doubled. By contrast, on a mol/mol basis, Applicants employ 1/5 to 1/10 the minimum amount of *Chung*, and 1/10 to 1/20 the amount of *Chung* which created a clearly stable mixture. It is clear, therefore, that the isocyanate of the present invention does not act as a scavenger.

More importantly, however, the compositions of *Chung*, like those of *White*

before him, are relatively high modulus compositions which employ conventional ingredients, a dialkoxy-terminated organopolysiloxane (or its precursors, dihydroxyorganopolysiloxane and trialkoxysilane) and condensation catalyst. In contrast, Applicants' compositions employ a silanol-terminated organopolysiloxane and a very reactive chain extender of the type disclosed by *JP '167*. This aminomethyldialkoxysilane chain extender is very reactive with hydroxyl groups; so reactive, in fact, that it serves as its own water scavenger, as taught by *JP '167*.

JP '167 was filed more than 3 years after the issuance of *White*, and there is little doubt that the inventors were aware of the use of scavengers such as those proposed by *White*. However, the *JP '167* inventors did not use a scavenger, nor did they even discuss using a scavenger, because they did not need one: their chain extender served as their scavenger. Thus, there is no motivation to combine *JP '167* with the scavenger teachings of *Chung*, since *JP '167* already included a scavenger and did not require another.

Secondly, one skilled in the art would not be motivated to utilize an isocyanate as a water scavenger in a composition which contains a tertiary amine, since tertiary amines are well known catalysts for the reaction of isocyanates with themselves to form isocyanurates or polyisocyanurates. Thus, adding an isocyanate as a scavenger in a composition containing a tertiary amine (*i.e.* the subject invention and *JP '167* chain extenders) would be expected to result in the rapid polycondensation of the isocyanate to isocyanurates, thus freeing the composition of isocyanate. No scavenger would then be left. For both the foregoing reasons, Applicants respectively submit that claims 1- 4 and 7 - 15 are non-obvious over *JP '167* in view of *Chung*. Withdrawal of this rejection is therefore solicited.

New claims 15 - 20 have been added to more particularly point out and distinctly claim certain preferred aspects of Applicants' invention. The claim amendments are fully supported by the examples as filed, and by the specification on pages 8 and 11 of the specification. Thus, no issue of new matter arises by virtue of their presentation.

Applicants submit that the claims are now in condition for Allowance, and respectfully request a Notice to that effect. If the Examiner believes that further discussion will advance the prosecution of the Application, the Examiner is highly encouraged to telephone Applicants' attorney at the number given below.

Respectfully submitted,

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